REMARKS

This application has been carefully reviewed in light of the Office Action dated November 3, 2003. Claims 11 and 25 have been amended. Applicant reserves the right to pursue the original claims and other claims in this and other applications. Applicant respectfully requests reconsideration of the above-referenced application in light of the foregoing amendments and following remarks.

Claims 1, 3-4 and 9-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fig. 11 of Chiang in view of Fig. 9 of Chiang. The rejection is respectfully traversed and reconsideration is requested.

Claim 1 recites a semiconductor device comprising, *inter alia*, "an insulator layer, a conductive plug . . . formed of a single conductive material, an etch-stop layer . . . a non-conductive layer having an etched via . . . wider in diameter than said conductive plug, and a conductive connector . . . including a first conductive layer . . . and a second conductive layer." (emphasis added). The Office Action acknowledges that Chiang's Fig. 11 does not teach Applicant's recited first and second conductor layer. To rectify this deficiency, the Office Action asserts that Fig. 9 of Chiang teaches a first and second conductor layer and can be combined with Fig. 11. Applicant respectfully submits that it is improper to combine Chiang's Fig. 11 with Fig. 9.

Chiang discloses that "FIGS. 10 and 11 illustrate an alternate embodiment of the present invention." (Col. 11, lines 12-13) (emphasis added). Chiang specifically discloses that "[a]lthough aluminum or aluminum alloys, for example are difficult to deposit conformally, they can be used in the alternate embodiment described herein." (Col. 11, lines 19-21) (emphasis added). In other words, Fig. 11 depicts an embodiment where aluminum is used as the interconnect material and not copper.

The Office Action asserts that "[i]t is conventional to use copper (Cu) with a barrier layer as a conductive interconnection layer instead of aluminum (Al) because copper has a lower resistivity than aluminum hence providing a higher speed." (Office Action, pg.

3). However, Chiang clearly teaches away from the Office Action's assertion. Chiang's Background of the Invention discloses that "[c]opper is typically not used as an interconnect material." (Col. 2, line 49) (emphasis added). Thus, there is no motivation to combine Chiang's Figs. 11 and 9 since the reference itself teaches away from such a combination.

First, there is no motivation to combine Figs. 11 and 9 since they are directed to providing alternate embodiments employing different interconnect materials. Second, Chiang discloses that it is not conventional to use copper as interconnect material. Third, Chiang's Background of the Invention also discloses that "the prior art teaches that the [copper] interconnects should not lie on a silicon nitride layer because it has a high dielectric constant." (Col. 2, lines 58-60) (emphasis added). The combination of Figs. 11 and 9 would result in a copper interconnect lying on a silicon nitride layer (23) which is not desirable.

Finally, the combination of the embodiments depicted in Figs. 9 and 11 is an impermissible hindsight reconstruction of the invention. Applicant respectfully submits that "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." M.P.E.P. § 2143.01 (emphasis added). Here, there is no teaching or suggestion in the reference, that Figs. 9 and 11 can be combined. In fact, Chiang teaches that Fig. 11 is a different embodiment employing a different interconnect material from the embodiment depicted in Fig. 9. Accordingly, Chiang's Figs. 9 and 11 cannot be combined without some suggestion within the reference itself for the combination.

Claims 3-4, and 9-10 depend from claim 1 and are allowable for at least the reasons set forth above for allowance of claim 1. Moreover, Chiang does not teach or suggest an etch stop layer that comprises silicon carbide as recited in dependent claim 4. Accordingly, withdrawal of the § 103(a) rejection is respectfully solicited.

Claims 5-6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Chiang in view of Wang. The rejection is respectfully traversed and reconsideration is requested.

Claims 5-6 depend from claim 1 and are similarly allowable for at least the reasons presented above with regard to claim 1. Wang is relied upon for teaching a silicon dioxide layer as an etch stop layer and does not rectify the deficiencies associated with Chiang. For at least these reasons, claims 5-6 should be allowable over the prior art of record.

Moreover, "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." M.P.E.P. § 2143.01 (emphasis added). There is no suggestion in Chiang that the etch-stop layer should be silicon dioxide as recited in claim 5, or a silicon nitride and silicon carbide layer as recited in claim 6. Accordingly, withdrawal of the § 103(a) rejection is respectfully solicited.

Claims 7-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Chiang in view of Hong. The rejection is respectfully traversed and reconsideration is requested.

Claims 7-8 depend from claim 1 and are similarly allowable for at least the reasons presented above with regard to claim 1. Hong is relied upon for teaching a BPSG layer and does not rectify the deficiencies associated with Chiang. For at least these reasons, claims 7-8 should be allowable over the prior art of record.

Moreover, there is no suggestion in Chiang that the non-conductive layer should be doped silicate glass as recited in claim 7 or BPSG as recited in claim 8. See M.P.E.P. § 2143.01. Accordingly, withdrawal of the § 103(a) rejection is respectfully solicited.

Claims 11, 15-17, 25, 27, 30-32, and 39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Chiang. The rejection is respectfully traversed and reconsideration is requested.

Chiang does not teach or suggest, "a conductive plug formed of a single conductive material . . . an etch-stop layer . . . an intermediate non-conductive layer . . . having at least a first and second etched via over said plug . . . and a first conductive layer . . . and a second conductive layer," as recited in claim 11 (emphasis added), nor a "a conductive plug formed of a single conductive material. . . an etch-stop layer . . . an intermediate non-conductive layer . . . having at least a first and second etched via over said plug, said first etched via being wider in diameter than said conductive plug, wherein said second etched via is above and has a greater diameter than said first etched via and . . . a conductive connector comprising a first conductive layer. . . and a second conductive layer," as recited in claim 25 (emphasis added).

Moreover, Chiang's Fig. 25 does not teach a single conductive plug. Chiang also does not teach or suggest "an intermediate non-conductive layer . . . having at least a first and second etched via over said plug, said first etched via being wider in diameter than said conductive plug, wherein said second etched via is above and has a greater diameter than said first etched via," as recited in claims 11 and 25. There is no support for the Office Action's assertion that Chiang teaches this limitation found in claims 11 and 25.

Claims 15-17 depend from claim 11 and are allowable for at least the reasons set forth above for allowance of claim 11. Claims 27, 30-32 and 39 depend from claim 25 and are allowable for at least the reasons set forth above for allowance of claim 25. Withdrawal of the § 103(a) rejection is respectfully solicited.

Claims 13-14 and 28-29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Chiang in view of Hong. The rejection is respectfully traversed and reconsideration is requested.

Claims 13-14 depend from claim 11 and are similarly allowable for at least the reasons presented above with regard to claim 11. Claims 28-29 depend from claim 25 and are similarly allowable for at least the reasons presented above with regard to claim 25. Hong is relied upon for teaching a BPSG layer and does not rectify the deficiencies associated with Chiang. For at least these reasons, claims 13-14 and 28-29 should be allowable over the prior art of record.

Moreover, there is no suggestion in Chiang that the non-conductive layer should be doped silicate glass as recited in claims 13 and 28, or BPSG as recited in claims 14 and 29. See M.P.E.P. § 2143.01. Accordingly, withdrawal of the § 103(a) rejection is respectfully solicited.

Accordingly, there are several important features of claims 1, 3-11, 13-17, 25, 27-32, and 39 that are not taught anywhere in the cited prior art. Accordingly, the rejection of claims 1, 3-11, 13-17, 25, 27-32, and 39 should be withdrawn. Allowance of the application with claims 1, 3-11, 25, 27-32, and 39 is respectfully solicited.

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Respectfully submitted,

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